

**201-15083A**

**HIGH PRODUCTION VOLUME (HPV)  
CHALLENGE PROGRAM**

**TEST PLAN**

**For**

**DIMETHYL METHYLPHOSPHONATE**

**CAS No. 756-79-6**

**December 23, 2003**

**Prepared by:**

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# Dimethyl Methylphosphonate Test Plan

## 1.0 INTRODUCTION

The DMMP Consortium, consisting of Akzo Nobel Functional Chemicals and Rhodia, Inc., has sponsored dimethyl methylphosphonate (CAS No. 756-79-6) in the U.S. Environmental Protection Agency's High Production Volume (HPV) program. This document identifies existing data of adequate quality to fulfill the DMMP HPV requirements, and outlines the testing to be conducted to fully satisfy the HPV program.

## 2.0 USE AND EXPOSURE

Dimethyl methylphosphonate (DMMP) is manufactured in a closed system. The vast majority of DMMP is used as an intermediate by the manufacturers to produce downstream products at their internal production facilities. There is minimal opportunity for occupational exposure during the manufacture of the product. The strictly controlled shipment to customers is primarily in 55 gallon drums. DMMP is used in a variety of applications, including as a flame retardant, intermediate, hydraulic fluid, antifoam agent, plasticizer, and textile conditioner. There is limited opportunity for exposure during its use in these applications.

## 3.0 EVALUATION OF EXISTING DATA AND PROPOSED TESTING

The available data for DMMP is summarized in the many robust summaries included with this document. The summarized data were obtained from company test reports, literature articles, government documents, company MSDS, and from other sources. Several electronic databases were searched for additional information pertaining to DMMP. Each robust summary provided herein contains a reliability ranking which uses the Klimisch reliability code. Also, each robust summary is fully referenced as to the source of the data.

The proposed testing plan is summarized in a table found on a following page. It lists the data presently available, the tests to be conducted, and the EPA or OECD test guideline that will be followed in the conduct of the test. A discussion of the information on DMMP presently available and the proposed testing follows.

### 3.1 Physical/Chemical Properties

Boiling point, vapor pressure, and specific gravity values are available from several sources and closely correspond with the values provided in the respective robust summaries. The water solubility and n-octanol:water partition coefficient for DMMP were recently determined. octanol:water partition coefficient is also available. Water solubility data are unavailable for DMMP. **Since sufficient data are available, no physical/chemical properties testing is proposed by the DMMP Consortium.**

### 3.2 Environmental Fate

A biodegradation test is available for DMMP and a robust summary for this study has been prepared. Several articles in the scientific literature describe the hydrolysis of phosphonate esters (1, 2, 3). The DMMP Consortium will obtain a copy of these articles and will determine whether the hydrolysis of DMMP is described in sufficient detail. **Since hydrolysis data are available from several peer reviewed journal articles, the DMMP Consortium is not proposing the conduct of a hydrolysis study.**

### 3.3 Ecotoxicity Tests

An acute fish toxicity test is available for DMMP and has been described in one of the robust summaries. **The DMMP Consortium proposes to conduct an acute toxicity test with aquatic invertebrates, using *Daphnia magna* as the test organism. It also proposes to conduct a toxicity to aquatic plants test, in which effects on the growth of the algae *Selenastrum capricornutum* is measured.**

### 3.4 Mammalian Toxicity

Acute toxicity tests are available for DMMP. Acute oral and dermal toxicity tests, and primary skin and eye irritation tests, are described in the robust summaries. A subchronic 90 day toxicity test has been conducted by one of the DMMP Consortium members. The results of this test are described in a robust summary. The repeated dose testing requirement is also satisfied by the National Toxicology Program chronic cancer bioassays which were conducted in both rats and mice. Robust summaries have been prepared for both of these chronic bioassays. Several genetic toxicity (mutagenicity) tests have been conducted by members of the DMMP Consortium. These tests include *in vitro* assays that used bacterial and mammalian cells as the test systems. *In vivo* mutagenicity assays were conducted in *Drosophila melanogaster* (fruit flies) and in laboratory rats. The *in vitro* and *in vivo* tests adequately determined the potential of DMMP to induce gene mutation and chromosomal aberrations. No additional genetic toxicity testing is required. Two special reproduction tests with DMMP have been published in the scientific literature. Robust summaries of both studies are included herein. In addition, there was sufficient diagnostic pathology of the male and female reproductive organs in the subchronic study and in the chronic rodent bioassays to adequately determine whether repeated exposure to DMMP results in altered morphology of the reproductive organs. No further reproduction testing is proposed. Two studies have been published that describe the effects of DMMP on fetal development. Robust summaries have been prepared for both developmental toxicity studies. **No mammalian toxicity testing is proposed by the DMMP Consortium.**

The proposed DMMP testing program is summarized in the following table.

# TEST PLAN

## Dimethyl Methylphosphonate

(CAS #756-79-6)

<u>Study Type</u>	<u>Information Available</u>	<u>Testing Proposed</u>	<u>EPA or OECD Guideline</u>
Physical/Chemical Characteristics			
Boiling Point	Yes	No	NA
Vapor Pressure	Yes	No	NA
Partition Coefficient	Yes	No	NA
Water Solubility	Yes	No	NA
Environmental Fate			
Photodegradation Estimate	No	EPA Model	NA
Stability in Water	Yes	No	NA
Biodegradation	Yes	No	NA
Fugacity	No	EPA Model	NA
Ecotoxicity			
Acute Toxicity to Fish	Yes	No	NA
Acute Toxicity to Aquatic Invert.	No	Yes	OPPTS 850.1010
Toxicity to Aquatic Plants	No	Yes	OPPTS 850.5400
Human Health Effects			
Acute Toxicity	Yes	No	NA
General Toxicity (Repeated Dose)	Yes	No	NA
Genetic Toxicity	Yes	No	NA
Reproductive Toxicity	Yes	No	NA
Developmental Toxicity	Yes	No	NA

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NA = Not Applicable

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### References

1. Christol, H., Levy, M, and Marty, C. Basic Hydrolysis of Phosphonates. I. Qualitative Study. J. Organomet. Chem. 12:459-470, 1968. (published in French)
2. Christol, H., Levy, M, and Marty, C. Basic Hydrolysis of Phosphonates. II. Quantitative Study. J. Organomet. Chem. 12:471-478, 1968. (published in French)
3. Hudson, R,F. and Keay, L. The Hydrolysis of Phosphonate Esters. J. Chem. Soc. 1956:2463-2469, 1956.